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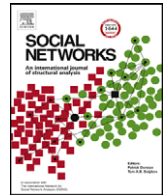
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## Ethnic segregation in context: Social discrimination among native Dutch pupils and their ethnic minority classmates

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### ABSTRACT

Social discrimination, defined as the relative preference for intra-ethnic over inter-ethnic relationships, was studied in pupils' networks in Dutch secondary school classes. While native Dutch pupils (ethnic majority members) mainly named fellow majority members, ethnic minority members reported ties with as many majority as minority members. Considering the ethnic composition of the classroom, however, majority members discriminated less than minorities. No strong effect of classroom ethnic composition on social discrimination was found, whereas neighborhood composition was shown to clearly influence social discrimination: ethnic minority members were more, and majority members less inclined to discriminate in neighborhoods with more ethnic presence.

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### 1. Introduction

Social networks in the Netherlands are segregated along ethnic lines. Over one-third of the Surinamese born inhabitants of the Netherlands report they predominantly meet members of the own ethnic group in their leisure time. This percentage is even higher for first generation immigrants from Turkey (80%) and Morocco (57%). The percentages for the second generation (24%, 52%, 43%, respectively) show that the children of immigrants are not as isolated from the native Dutch majority as their parents, but also that the social integration between ethnic minority groups and the native Dutch majority is far from complete (Dagevos and Gijbels, 2007).

The school is often considered crucial in the inter-ethnic integration of youngsters. Classmates spend a lot of time together, and affect each other's social development considerably (Kassenberg, 2002). At school, more than in most leisure contexts, teenagers are exposed to peers of other origins. Nevertheless, Saharso (1992) reports that only one-third of the ethnic minority adolescents attending a Dutch secondary school, counted one or more native Dutch peers among their friends.

The level of inter-ethnic integration at school is the outcome of two components. First, the ethnic composition of the school population determines a pupil's opportunities to establish inter-

group relations through the availability of members of the different groups. For example, a Moroccan pupil in a classroom dominated by native Dutch, has more opportunities to befriend native Dutch peers than a Moroccan pupil in a more ethnically diverse classroom. In general terms, the opportunity for a member of one group to establish social relationships with another group, is positively associated with the relative size of the other group (Blau, 1994).

Secondly, pupils use ethnic background as a criterion in the social selection among the available peers. We use the term 'social discrimination' to refer to the tendency to favor intra-ethnic relationships over inter-ethnic relationships, given the availability of potential relationships. A range of studies has shown that two classmates of different ethnic groups are less likely to be friends than two classmates of the same ethnic group (e.g. Clark and Ayers, 1992; Hallinan, 1982; Hallinan and Smith, 1985, 1989; Hallinan and Teixeira, 1987; Hallinan and Williams, 1987, 1989; Patchen, 1982; Rícan, 1996). Teenagers living in the Netherlands are no exception to this rule (Dors, 1987; Teunissen, 1988; Baerveldt et al., 2004).

The present study on social relations in classrooms aims to shed more light on teenagers' inclination to socially discriminate among their classmates, and, in particular, on how this is affected by the ethnic composition of their surroundings. We distinguish between social discrimination by ethnic minorities and the Dutch majority. Most studies on inter-ethnic relationships only assess discrimination by majority members, treating ethnic minority members as passive targets. Fewer studies have focused on social discrimination by ethnic minority members, and studies focusing on both are even scarcer (Shelton, 2000). Moreover, we distinguish between two social contexts that together make up a large part of teenagers'

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**Table 1**

The influence of a larger number of minority members in the classroom and in the neighborhood on social discrimination among classmates. Predictions derived from contact and competition theory.

	Number of minority members in	(1) Contact theory	(2) Competition theory
Majority members			
(1)	Classroom	–	+
(2)	Neighborhood	0	+
Minority members			
(3)	Classroom	0	+
(4)	Neighborhood	0	+

inter-ethnic experience: the classroom and the neighborhood. As will be discussed below, the effect of ethnic composition on social discrimination may differ between the two contexts. Whereas many studies focused on either the ethnic composition of the school context (e.g. Hallinan and Smith, 1985; Hallinan and Williams, 1989; Joyner and Kao, 2000; Moody, 2001; Vervoort et al., 2008; Quillian and Campbell, 2003), or on the neighborhood context (e.g. Esser, 1986; Giles and Evans, 1986; Kalin, 1996; Oliver and Wong, 2003; Quillian, 1995; Taylor, 1998), studies addressing both contexts are rare (Patchen, 1982). We attempt to answer the following research question:

What is the effect of the ethnic composition of the classroom and of the neighborhood on the tendency of majority and minority members to socially discriminate among their classmates?

### 1.1. Social discrimination in context

Two theoretical views serve as guidelines on how the ethnic composition of a social context may affect people's tendency to socially discriminate: contact theory and competition theory. Contact theory (Allport, 1954; Pettigrew, 1998) considers the perceived cultural difference between groups. According to this view, negative inter-group relationships result from prejudices. Contact with members of other groups is argued to lead to rectification of these prejudices, a more positive attitude towards these groups and an enhanced willingness to choose a member of this group as a friend. Also when prejudices are not false, and true cultural differences exist, contact may lead to understanding or adaptation, paving the way for satisfactory interaction with members of the other group.

Competition theory stresses the inherently competitive relations between ethnic groups (Blalock, 1957; Bobo and Hutchings, 1996; Quillian, 1995). In this view, inter-group boundaries are actively and purposefully constructed and maintained, whether it is for material purposes or more symbolically, for the construction and maintenance of social identity (Tajfel and Turner, 1979). Finding out that the out-group is rather like the ingroup, may not be enough to give up ingroup preferences. Instead, people may be more likely to discriminate against a similar group than against a group that is clearly distinguishable from the own group (Jetten et al., 2001). According to this view, experienced threat will enhance discrimination. Threat is likely to be experienced when the other group acquires the power to threaten the position of the own group.

In translating these two general theoretical viewpoints into predictions, we distinguish different consequences of the ethnic composition of social context depending on the type of context and on whether ethnic minority or majority members are concerned. Table 1 shows the predicted effects of the number of minority members in classrooms and in neighborhoods on social discrimination in the classroom by ethnic minority and majority teenagers, respectively.

Starting with contact theory (Table 1, column 1), the general prediction is that people will have more favorable attitudes towards the members of other groups the more members of these other groups surround them. However, according to Allport – the most

influential advocate of contact theory – contact would have to be personal to lead to 'the perception of common interest and common humanity' (Allport, 1954, p. 281). Casual and superficial contact, he argues, would rather enhance hostility, in line with the prediction of competition theory. In support of this notion, Forbes (1997) concludes in a review, that direct contact between individuals reduces prejudice, but that studies on large-scale contexts showed that the presence of out-group members correlates positively with prejudice (for evidence in the Dutch context see Coenders, 2001). Since neighborhoods are large-scale contexts, where inter-group contact is scarce and superficial, contact theory does not predict that encounters in the neighborhood context decrease discrimination (rows 2 and 4). Because classrooms are face-to-face groups, enforcing interpersonal contact, contact theory is expected to apply here, at least to majority members.

Majority members will have a more positive attitude towards minorities when more minority peers surround them. As a result, majority members in ethnically mixed classrooms are predicted to discriminate less in favor of their own group than majorities with only few minority peers in their immediate environment (row 1). It is tempting to apply the same logic to social discrimination by minority teenagers, but in this case contact theory appears less applicable. Because of the overall numerical differences, most minority members will have had ample exposure to majority members, and their classmates will be less crucial for the reduction of their prejudices. Indeed, Pettigrew and Tropp (2000) concluded from a meta-analysis that contact had a smaller (diminishing) effect on prejudices of minority members than on prejudices of majority members. Consequently, the effect of the ethnic composition of the classroom on social discrimination by minority members are predicted to be zero (row 3).

Competition theory's general prediction (Table 1, column 2) is that people will feel more threatened by and – therefore – less favorable towards members of other groups the more members of these other groups surround them. The theory does not offer a straightforward argument for different effects of classroom and neighborhood composition. On the one hand, neighborhoods can offer the presence of an anonymous out-group, which can easily contribute to a sense of fear. On the other hand, when there are group conflicts at school, they are often more personal and more difficult to avoid, which also adds to the threat. Therefore, based on competition theory, the ethnic composition is expected to increase social discrimination in both contexts.

Competition theory can also be applied to majority as well as to minority members, be it for different reasons. It predicts that majority members will feel threatened more often when the number of minority members is larger, and consequently, they will socially discriminate more (rows 1 and 2). However, competition theory as commonly formulated, seems less applicable to ethnic minority members (Stephan and Stephan, 2000). Whereas majority members are used to a position of power, ethnic minority members are used to a position in which adjustment is often assumed. Therefore, an increase of minority members in a classroom may be more threatening to majority members than an increase of major-

ity members will be to minority members. Among ethnic minority members, a more central component than ‘feeling threatened’ may be ‘becoming threatening’. According to resource mobilization theory (McCarthy and Zald, 1977), minority members are more likely to follow a collective strategy when they have more resources. These resources strongly depend on their numbers. In support of this notion, Moghaddam and Perreault (1992) found that minority members feel less need to adapt when they are a relatively large group. Instead of adaptation they choose competition. Consequently, following a social competition perspective that includes the idea of resource mobilization, it can be predicted that minority members socially discriminate more when they have more fellow minority members in their environment (rows 3 and 4).

## 1.2. Statistical analysis of social discrimination in context

Early analyses of ethnic segregation in context were conducted at the level of the social context, resulting in a measure of social segregation at the level of the classroom or school (e.g. Dors, 1987; Schofield and Sagar, 1977; Schofield, 1979; Shrum et al., 1988). These measures control for availability, but are limited in the sense that segregation scores typically do not incorporate individual level characteristics other than ethnicity. Neither do they usually distinguish between social discrimination by majority and minority members.

Research at the dyadic level has long been problematic because of the statistical interdependencies that come along with social network data. Hallinan started out ignoring these complexities using simple logistic regression (Hallinan and Smith, 1985; Hallinan and Teixeira, 1987; Hallinan and Williams, 1989). As a result, the reported levels of significance are unreliable and probably overestimated. In her later studies, (Hallinan and Smith, 1989; Kubitschek and Hallinan, 1998) she had an enormous pool of data and was able to select a much smaller portion of independent dyadic relations.

Baerveldt et al. (2004) used the  $p_2$  model to establish the existence of social discrimination among ethnic groups in Dutch high schools more thoroughly than before, ruling out several alternative explanations for ethnic segregation in social networks. Similarly, Moody (2001) and Quillian and Campbell (2003) used the  $p^*$  model (Wasserman and Pattison, 1996) to establish parameters of the net level of social discrimination per school. In these applications results of  $p_2$  or  $p^*$  models were obtained separately for each network and combined in a meta-analysis.

In the present study, the multilevel  $p_2$  model (Zijlstra et al., 2006; Baerveldt et al., 2007) is used, which was developed to analyze multiple networks simultaneously (with the same  $p_2$  model specification) while taking into account differences between classroom networks which may be explained by classroom characteristics. The multilevel  $p_2$  model investigates the effect of individual, dyadic, and network characteristics on dyadic outcome probabilities. Modeling (relative) probabilities instead of (absolute) numbers, the  $p_2$  model provides the possibility to distinguish opportunity (social context) from social discrimination effects.

The multilevel  $p_2$  model is an extension of the  $p_2$  model (Duijn et al., 2004; Zijlstra et al., 2009). The unit of analysis in the  $p_2$  model is the dyad, i.e. the pair of directed ties (either absent or present) between two actors or nodes in the network. A dyad in these data consists of two pupils in the same classroom, where both actors are once the sender and once the receiver of a tie. The  $p_2$  model models the probability of a dyadic outcome, taking into account the dependence between dyads involving the same actors. Therefore, the  $p_2$  model can be viewed as a random effects multinomial logistic regression model with a complex variance structure to account for the dependence between dyads. Moreover, the  $p_2$  model incorporates sender and receiver characteristics, such as ethnic group membership, and dyadic characteristics, such as whether the dyad

consists of pupils with the same or different ethnic group membership.

Statistical methods to correctly deal with the problems of interdependency in social networks have only become available recently, in particular the  $p_2$  and  $p^*$  or exponential family random graph models (ERGMs, see, e.g. Robins et al., 2007). The main distinction between  $p_2$  and  $p^*$ /ERGM is that the  $p^*$ /ERGM approach is to model the outcome of the complete network using more complex statistics reflecting dependence between actors beyond the dyad. The  $p_2$  model focuses on dyadic outcomes and uses random effects for senders and receivers and (multiple) networks to model further dependence between the ties in a social network (thus, the  $p_2$  model explicitly models reciprocity). The  $p_2$  model and its multilevel extension are implemented in StOCNET (Boer et al., 2006).

## 2. Method

### 2.1. Data and measures

The data consist of complete networks of 86 classrooms in 37 schools in 16 different municipalities, containing 1737 pupils. The data were collected in two studies, the first containing 216 pupils of ten classrooms in five secondary schools in four municipalities participated between December 1999 and May 2000 (Vermeij, 2006). Teachers were approached through informal connections, and administered the questionnaires in some of their own school classes. In the second study, 1521 pupils of 76 classrooms in 33 schools in 13 other municipalities participated in May or June 2000 (Vermeij, 2006). This time, schools in selected municipalities were approached as part of a larger research project on cultural participation (Ganzeboom et al., 2001). Within these schools, classrooms were selected as to get an equal distribution of track levels over municipalities. Classrooms were not selected according to their ethnic composition.

The set-up of the two studies is highly similar. For both, high school pupils from the same age group completed a questionnaire with identical items, during a regular class hour. The municipalities included Amsterdam, Rotterdam and Utrecht, three of the four largest cities in the Netherlands, as well as middle-sized and small municipalities. Except for two classrooms at the fourth grade, all classes were at the third grade of high school. The Dutch secondary educational system at the time comprised four main track levels – preparatory vocational education (VBO), lower general secondary education (MAVO), higher general secondary education (HAVO) pre-university education (VWO) – all being represented in about equal numbers in the sample (23, 22, 21, and 18, respectively). Fifty-two percent of the respondents were girls and the average age of the respondents was 15.6 years at the time of data collection.

Whereas most previous studies have used a single friendship item to measure the tie between two pupils (e.g. Hallinan and Smith, 1985; Hallinan and Williams, 1989; Moody, 2001; Quillian and Campbell, 2003), we used five items referring to different aspects of social relationships among classmates to measure the social network. Two of the items concerned support: ‘Who helps you with practical matters, like homework or finding a job?’ (practical support) and ‘Who helps you when you feel down, for example because of problems at home or because your relationship ended?’ (emotional support). These items were copied from a similar study (Baerveldt et al., 2004), in which they proved reliable. Two other items referred to communication: ‘With whom do you talk about what’s right and what’s wrong, for example about religion and justice?’ (norms) and ‘With whom do you talk about what you like, for example in music or art?’ (taste). The fifth item referred to shared activities: ‘With whom do you spend time outside of school?’



Respondents reported each relation with a fellow pupil by writing the classmate's identification code from a list supplied separately from the questionnaire containing all pupils' names and identification codes. The questionnaire allowed respondents to report at most twelve classmates for each of these relationships. Pupils also filled in their own identification code on the form. The five network items differed in threshold. Pupils reported to talk about their taste with an average of more than three classmates (3.20; SD 2.44), while they reported to talk about norms with less than two classmates (1.91; SD 1.92). Practical support was more often reported than emotional support (2.38, SD 2.01; 1.89, SD 1.82, respectively). Pupils spent time outside school with on average more than two classmates (2.26; SD 2.04). Because the overlap between the five items was large (tetrachloral correlations among items were all 0.8 or higher), combining them into a single variable was deemed appropriate. A pupil was considered to have a tie to a classmate when responding positively to at least one of the five relations. Such a tie is not necessarily a friendship tie, but rather a weak tie indicating a broad form of social interaction.

Respondents were assigned to ethnic categories based on the countries of birth of themselves and their parents. If pupils and both parents were born in the Netherlands, they were classified as majority members. Also, immigrants from another European country, an Anglo-Saxon country, or from Indonesia (a former Dutch colony), were classified as majority members. The reason for this is that several measures indicate that these 'Western' immigrants are much more similar to native Dutch than other immigrants: 74.2% had at least one parent born in the Netherlands, as compared to 13.3% of the other immigrants, and they were similar to the native Dutch on measures of ethnic identity and family acculturation (not reported). Only when respondents, or at least one of their parents, were born outside Europe, Indonesia or the Anglo-Saxon countries, they were classified as minority members (19%). This category consisted of immigrants from Morocco (5.0%), Turkey (3.4%), Suriname and the Dutch Antilles (4.5%) and a range of other countries (6.2%).

To assess respondents' neighborhood, they were asked to provide the four digits of their six character postal codes. In the ten classrooms of the first data set postal codes had not been asked, and another 199 respondents refused to report them. These missing values were replaced with the modal postal code in the classroom. In the data 360 postal code areas were represented, each on average in almost two classrooms. The number of people living in these areas varies largely, from less than 200 inhabitants to over 23,000 (source: [Statistics Netherlands, 2008](#)). However, the borders of these areas are drawn around physical phenomena such as roads and waterways, and the postal code area can be assumed to give an indication of a person's spatial surrounding experienced as her neighborhood. In order to determine the ethnic composition of the neighborhood, the four digits of the postal codes were matched with the percentage of non-Western ethnic minority members in this area at the time of data collection (source: [Statistics Netherlands, 2008](#)).

## 2.2. Set-up of the $p_2$ model analyses

The probability of the four possible dyadic outcomes is modeled in the  $p_2$  model. Two dyadic outcomes are symmetric, either null when both actors report the tie with the other actor as absent, or mutual when both actors report the tie as present. The other two are asymmetric, when either actor reports the tie being present, while the other does not. The general model parameters are density (the overall log-odds of a tie), and reciprocity (the log-odds of a symmetric dyadic outcome). To test the hypotheses on social discrimination, the density parameter is further modeled using actor

and dyadic covariates. Because reciprocity as such is not the focus of this study, no covariates are used to further model the reciprocity parameter. The dependence between dyads sharing an actor is modeled through random sender and receiver effects with a variance structure parameterized by sender and receiver (co)variances reflecting differential outgoingness and popularity of actors and the correlation between these individual tendencies. Differences in density over classrooms not explained by individual, dyadic or classroom characteristics is captured in a random effect per classroom, whose variance indicates the between classroom density variability.

Three indicators were created to measure social discrimination: Two for dyadic ethnic composition, 'majority to majority' and 'minority to minority', and one for the ethnicity of the sender, 'majority'. The variable 'majority to majority' indicates that both sender and receiver are majority members and takes on the value 1 for majority–majority dyads and 0 for the other dyadic ethnic combinations. Likewise, indicator 'minority to minority' is 1 for minority–minority dyads and 0 for the other combinations. These three indicator variables are sufficient to distinguish the four possible ethnic compositions with minority–majority, for which all indicators are 0, as the reference group. Because majority–majority and majority–minority dyads have in common that the sender is a majority member ('majority' indicator equals 1), the majority–majority indicator represents the difference between the modeled density of majority–majority and majority–minority dyads. Thus, majority–majority can be viewed as the measure for social discrimination by majority members. Similarly, minority–minority equals the difference between minority–minority and minority–majority dyads measuring social discrimination by minority members. In the first multilevel  $p_2$  model the overall presence of social discrimination regardless of any control variables was investigated through these indicator variables.

To assess the extent to which friendship choices can be attributed to ethnicity, and not to other individual or dyadic characteristics possibly correlated with ethnicity, we used several control variables in the next step. The gender composition of the dyad was incorporated, because the strongest divider among adolescents is gender ([Houtzager and Baerveldt, 1999](#); [McPherson et al., 2001](#); [Shrum et al., 1988](#)). In addition, we controlled for the absolute difference in school marks between pupils. Marks, in the Netherlands measured on a scale from 1 to 10, represent cognitive abilities as well as motivation for school work, which both have been shown to be relevant selection criteria ([Ryan, 2001](#)). Respondents were asked to report their average mark at their last school report, as well as their marks for Dutch and mathematics. If the average mark was not reported, the other two marks were used as an indication. If no marks were reported, pupils received the average score of their classmates. A final control variable represented whether the sender and receiver lived in the same municipality. Pupils who live close to each other are more likely to spend time together after school, for instance by traveling together. In addition, the municipality may represent similarities in other features such as family income or religion. These covariate effects were added in a second model.

In two separate steps, the effects of the neighborhood's ethnic composition and of the classroom's ethnic composition on social discrimination were investigated. The proportion of minority group members in sender's neighborhood and the proportion of minority group members in the classroom were used as covariates, separating the effect for social discrimination by majority and social discrimination by minority by defining interaction effects with the three previously defined indicator variables for dyadic composition.

Finally, the neighborhood and classroom effects were both incorporated in three multilevel  $p_2$  models to assess their relative importance.

**Table 2**

Descriptive statistics by ethnicity and gender for number of ties and percentage minority members in neighborhood.

Pupil	<i>n</i>	Number of ties sent			Percentage minority members neighborhood		
		Mean	(SD)	Mode	<i>n</i>	Mean	(SD)
Majority	1283						
Boy	620	4.2	(2.7)	3	512	7.5	(7.9)
Girl	663	5.1	(2.7)	4	624	7.5	(7.8)
Minority	306						
Boy	121	3.3	(1.9)	3	89	23.1	(19.7)
Girl	185	4.1	(2.4)	3	162	22.1	(18.7)
Total	1589	4.5	(2.6)			11.4	(13.1)

**Table 3**Classroom composition (*n* = 84).

Classroom	Median	Mode	Minimum	Maximum
Size	20	23	5	29
Number of boys	9.5	12	0	23
Number of girls	10.5	11	0	21
Number of majority members	18	20	1	27
Number of minority members	3	2	0	19
Percentage minority members	22	13 <sup>a</sup>	0	90
Majority member percentage minority in neighborhood ( <i>n</i> = 74)	7	9 <sup>a</sup>	1	53
Minority member percentage minority in neighborhood ( <i>n</i> = 62)	13	16 <sup>a</sup>	1	62

<sup>a</sup> Mean.

### 3. Results

#### 3.1. Descriptives

After excluding respondents who had skipped the network questions, failed to report their identification code or who had not reported their ethnicity or gender, a data set resulted, consisting of 1589 senders (80.7% majority members; 46.6% boys) 1652 receivers (841% majority members; 45.8% boys), and 32492 directed ties (71.6% majority–majority; 6.0% minority–minority; 11.2% majority–minority; 11.2% minority–majority; 26.4% boy–boy; 29.8% girl–girl; 21.5% boy–girl; 22.3% girl–boy). More information on the composition of the sample of pupils and of the 84 remaining classrooms can be found in [Tables 2 and 3](#), respectively.

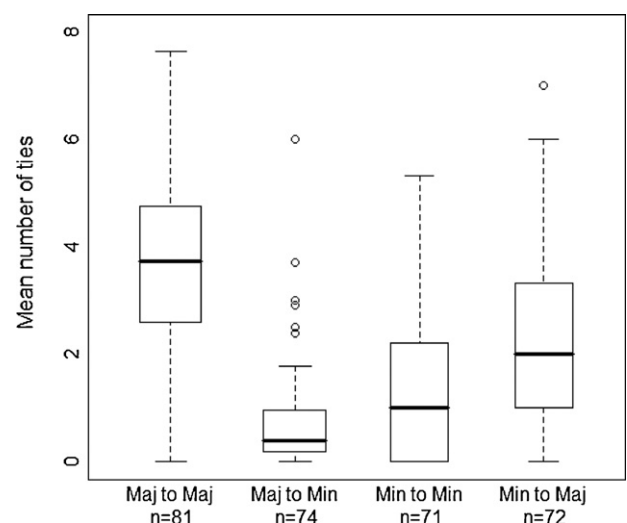
Girls reported approximately one tie more than boys (4.9 vs. 4.1;  $t = 6.2$ ,  $p < 0.001$ ); a similar difference was found for majority members compared to minority members (4.7 vs. 3.8;  $t = 5.8$ ,  $p < 0.001$ ). The overall mean dyadic difference in marks was 0.71 points (SD 0.61), and only 0.03 points lower for dyads with at least one tie present ( $t = 4.1$ ;  $p < 0.001$ ). The probability of a tie in dyads with pupils living in the same municipality was larger than in dyads with pupils not in the same municipality (23% vs. 20%,  $\chi^2 = 43.7$ ,  $p < 0.001$ ).

[Table 2](#) also gives the mean percentages of minority members in the neighborhood for the four groups differing in ethnicity and gender, both over all pupils and over the classrooms. The percentages reflect the ethnic segregation in both contexts: for minority members it is approximately 15% larger than for majority members. The difference in class mean percentages ([Table 3](#)) is less large, approximately 10%.

The distribution of the mean number of ties over the dyads in 84 classrooms is represented by a boxplot in [Fig. 1](#). Majority members reported ties with on average 3.7 (SD 1.6) other majority members (computation based on 81 classes with two or more majority members) and only on average 0.74 (SD 0.96) minority member classmate (based on 78 classes with one or more majority members and one or more minority members). The tie composition of minority adolescents was more balanced: with on average 2.4 (SD 1.7,  $n = 72$ ) majority ties and 2.2 (SD 1.4,  $n = 71$ ) minority ties. Note the skewed distribution of the mean number of ties for all ethnic

dyadic combinations, except for majority–majority ties, resulting in median values lower than the means. Thus, whereas majority teenagers predominantly mingle with majority classmates, minority teenagers have a more multicultural social life at school.

[Fig. 2](#) shows the classroom distribution of the densities (i.e. probability of presence of a tie) in dyads of different ethnic composition. Both ethnic majority and ethnic minority members were more likely to report a relationship with a classmate of equal ethnicity than with a classmate with a different ethnic background. It also shows that the density of minority–minority ties has the largest median (0.29), slightly larger than the density of majority–majority ties (median 0.24) but with a much larger spread, due to the smaller number of ‘available’ fellow minority members in the 72 classrooms with at least two ethnic minority member pupils (see also [Table 2](#)). The median of majority–minority dyads is lower, 0.20, and the median of minority–majority dyads is lowest with 0.16. Thus,

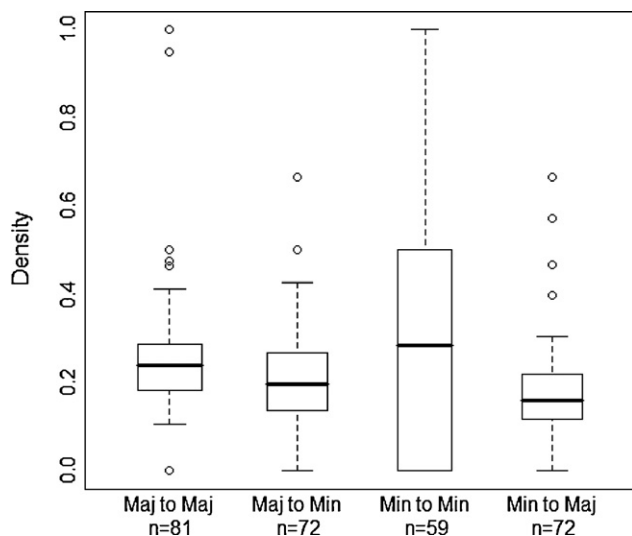


**Fig. 1.** Distribution of mean number of directed ties between ethnic majority and ethnic minority members over the classrooms (Note: *n* indicates the number of classrooms for which the numbers were available.).

**Table 4**Coefficients and standard errors of  $p_2$  multilevel models.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Dyadic composition effects							
Majority sender (Maj)	0.503** (.16)	0.492** (.16)	0.0672 (.20)	0.450 (.26)	0.123 (.20)	0.559* (.27)	0.395 (.29)
Social discrimination by majority (DisMaj)	0.0035 (.086)	0.108 (.089)	0.278** (.097)	−0.0284 (.14)	0.279** (.11)	−0.0853 (.15)	0.0150 (.17)
Social discrimination by minority (DisMin)	0.799** (.096)	0.859** (.10)	0.526** (.16)	0.780** (.20)	0.524** (.14)	0.875** (.19)	0.730** (.22)
Neighborhood effects							
Proportion minority members in neighborhood (PMinN)			−1.42** (.49)		−1.67** (.49)	−0.532* (.25)	−1.47** (.56)
PMinN × Maj			2.15** (.81)		2.13** (.74)		2.42** (.87)
PMinN × DisMaj			−1.08** (.49)		−1.11** (.50)		−1.96** (.57)
PMinN × DisMin			1.48** (.50)		1.50** (.48)		1.55** (.57)
Classroom effects							
Proportion minority members (PMinC)				−0.0594 (.45)	0.402* (.19)	0.197 (.46)	0.667 (.47)
PMinC × Maj				−0.0115 (.78)		−0.286 (.77)	−1.14 (.89)
PMinC × DisMaj				0.756 (.44)		0.864 (.45)	1.55** (.57)
PMinC × DisMin				0.135 (.48)		−0.0323 (.46)	−0.632 (.52)
Control variables							
Girl sender		−0.0640 (.13)	−0.0764 (.12)	−0.0700 (.12)	−0.0548 (.10)	−0.0782 (.11)	−0.0542 (.13)
Both girls		1.46** (.072)	1.47** (.069)	1.46** (.069)	1.46** (.063)	1.47** (.065)	1.46** (.079)
Both boys		1.15** (.080)	1.15** (.077)	1.14** (.072)	1.16** (.059)	1.14** (.065)	1.15** (.072)
Difference in marks (absolute)		−0.0668** (.024)	−0.0633** (.023)	−0.0605** (.023)	−0.0638** (.026)	−0.0652** (.024)	−0.0672** (.022)
Same municipality		0.310** (.033)	0.320** (.036)	0.306** (.037)	0.326** (.036)	0.324** (.034)	0.322** (.035)
General model parameters							
Density	−3.16** (.10)	−4.17** (.14)	−3.88** (.15)	−4.08** (.18)	−4.00** (.14)	−4.10** (.16)	−4.06** (.17)
Reciprocity	3.84** (.075)	3.52** (.076)	3.54** (.079)	3.53** (.081)	3.51** (.072)	3.51** (.074)	3.54** (.079)
Random effects							
Between classrooms							
Density variance	.066 (.013)	.092 (.019)	.093 (.019)	.097 (.020)	.093 (.019)	.098 (.020)	.098 (.020)
Within-schoolclasses							
Sender variance	.680 (.051)	.774 (.053)	.785 (.056)	.775 (.055)	.775 (.055)	.771 (.055)	.782 (.056)
Receiver variance	.583 (.045)	.597 (.044)	.606 (.048)	.597 (.046)	.598 (.045)	.590 (.044)	.604 (.047)
Sender–receiver covariance	−.558 (.044)	−.550 (.042)	−.564 (.047)	−.558 (.045)	−.554 (.043)	−.551 (.043)	−.563 (.046)
Number of dyads (classrooms)	15,188 (84)	15,052 (84)	13,846 (83)	13,846 (83)	13,846 (83)	13,846 (83)	13,846 (83)

Note 1: Standard deviations are in parentheses. Note 2: Significance of fixed effects was determined using a  $t$ -test. For the random effects no significance is determined.\*  $p < .05$ .\*\*  $p < .01$ .



**Fig. 2.** Density (the number of observed ties relative to the number of possible ties) of directed ties between ethnic majority and ethnic minority members over the classrooms (Note:  $n$  indicates the number of classrooms for which the numbers were available.).

correcting for the opportunity structure by considering the probabilities that ties are present relative to the number of available dyads, rather than simply regarding the number of ties present, sheds a different light on the tendency to socially discriminate. Minority teenagers have more mixed social networks in the classroom, but they appear to socially discriminate stronger. In the analysis with the multilevel  $p_2$  model social discrimination and the influence of social contexts is further investigated.

### 3.2. Results of the multilevel $p_2$ model analysis

Table 4 contains the parameter estimates of various multilevel  $p_2$  models. The dyadic composition, neighborhood and classroom effects are the  $p_2$  model parameters we are most interested in. These are all density effects, i.e. influencing the probability of the dyadic outcomes. The table reports in parentheses the standard errors of all estimates. The significance of effects is determined by approximate  $t$ -tests and indicated in the table as well.

#### 3.2.1. Social discrimination among classmates

Model 1 estimated the effect of dyadic ethnic composition over all classrooms, averaged over all neighborhood and class ethnic compositions in the sample. The finding in Fig. 1 that majority members tended to report more relations was confirmed in this analysis through the positive effect of 'Majority Sender' of 0.503. The small and non-significant effect of 'Social discrimination by Majority' revealed that, overall, majority members were as likely to choose majority members as minority members, conform the finding in Fig. 2. On the other hand, the fewer ties reported by minority members were more likely to be directed to other minority members than to majority members, in view of the positive effect of 'social discrimination by Minority' (0.799). The negative density effect of  $-3.16$  indicates that the probability of a tie between two pupils was less than 0.50 for ties from minority members to majority members. Although the positive sign of the dyadic composition effects increases this probability for the other dyadic combinations, it is never larger than 50%. The positive estimate of the reciprocity parameter signifies a tendency to report more symmetric than asymmetric dyadic outcomes (here, mostly null).

At the bottom of the table the random effects are reported, measured by the variability between and within classrooms. The

density variance indicates how much the general density varies over classrooms. The variability due to differences between classrooms is low compared to the variability between pupils to send and receive ties, as expressed by the sender and receiver variances. The sender variance is slightly larger than the receiver variance. Their covariance is negative, revealing that pupils with a larger than average propensity to report ties, tend to have a smaller than average propensity to receive ties. The results of the variance structure did not change much in the next analyses, although the random effects increase from the empty model to all models due to the adding of explanatory variables, a phenomenon known from multilevel logistic regression (see Snijders and Bosker, 1999, section 14.3.5).

In Model 2 in Table 4 the dyadic control variables were added. When controlling for gender effects, and homogeneity effects according to marks (ability and school motivation) and municipality, no different conclusions were drawn with respect to social discrimination than in Model 1, although the estimated parameter of social discrimination by majority showed a small but not significant increase. According to expectations, gender made a big difference. Positive relationships between classmates of the same gender were much more common than inter-gender relationships, in view of the large positive density effects for dyads with both girls or both boys. Note for instance that the effect of girl–girl ties is considerably larger than the effect of minority–minority on the probability of a tie. The small but significantly negative effect of absolute difference in marks revealed a tendency for pupils to choose others with similar marks. Finally, pupils living in the same municipality were relatively strongly inclined to have a relation with one another. The effects of the control variables were stable over the different analyses, and are not further commented on.

#### 3.2.2. The effect of ethnic composition of the neighborhood on social discrimination

In Model 3 the neighborhood context was incorporated by adding interaction effects of the social discrimination parameters (i.e. 'Majority sender', 'Social discrimination by Majority' and 'Social discrimination by Minority') with the proportion minority members in the sender's neighborhood. The model was estimated for 83 classrooms (one of the schools with no individual neighborhood information dropped out of the analysis). The main effects of the social discrimination parameters, which have changed, are now to be interpreted as the estimate of social discrimination among classmates who have no minority members in the neighborhood. Thus we find evidence for social discrimination by majority members in this situation, and even more so for social discrimination by minority members although the effect is reduced compared to the previous two models. The significant and negative main effect of the proportion minority members in the neighborhood (PMinN) indicates that the probability of relations decreased for pupils from neighborhoods with higher proportions minority members. The significantly positive interaction effect of PminN with 'Majority Sender' reveals that the tendency of majority members to send ties increased with the percentage minority members in their neighborhood. The significant negative interaction effect of PminN with 'Social discrimination by Majority' (DisMaj) showed that the tendency for social discrimination by majority members decreases with the percentage minority members in their neighborhood. On the other hand, the positive interaction effect of PminN with 'Social discrimination by Minority' (DisMin) showed the opposite effect of percentage minority members on the tendency to socially discriminate for minority members: it increases with the percentage minority members in the neighborhood. Thus, whereas majority teenagers living in colored neighborhoods are relatively likely to mingle with minority classmates, ethnic minority teenagers living in these neighborhoods discriminate more in favor of ethnic minori-



ties. In other words, both groups discriminate more when living among more ingroup members.

### 3.2.3. *The effect of ethnic composition of the classroom on social discrimination*

Model 4 was obtained by adding the proportion of minority members in the classroom to investigate only the effect of social context through classroom. The results are to be interpreted along the same lines as in Model 3. The dyadic composition effects, now for pupils from classrooms with no ethnic minority members, are hardly different from the effects obtained in the first models. The main effect of the proportion minority members in the classroom (PminC) is quite small and not significant. None of the interaction effects of PminC with the dyadic ethnic composition were significant, although the positive interaction effect of PminC with DisMaj is relatively large, suggesting increasing social discrimination by majority members in classrooms with more ethnic minority members. Overall, the classroom context seems to have a smaller effect than the neighborhood context.

### 3.2.4. *The simultaneous effect of ethnic composition of the neighborhood and the classroom on social discrimination*

In the next three models (5 through 7) the effects of both social contexts are studied. In Model 5 the focus was on the effect of neighborhood context while controlling for classroom context. The proportion minority members in neighborhood and classroom were used as separate effects, without taking into account their possible interdependence. The results for dyadic composition and neighborhood effects are the same as in Model 3. New is a significant main effect of PminC, which is to be interpreted as an increasing probability of a tie present in classrooms with a higher percentage of minority members, controlling for the other effects. In Model 6, the impact of the classroom context on dyadic ethnic composition effects was studied controlling for neighborhood context. Like in Model 4, no clear influence of the classroom context was found. In the final Model 7, the simultaneous influence of both contexts on dyadic ethnic composition effects was investigated. The slight increase in standard errors confirms the mutual dependence between the contexts and the difficulty to separate their effects. Nonetheless, the dyadic composition effects as well as their interaction effects with neighborhood context are quite stable, supporting once more the presence of social discrimination by minorities, which increases with the presence of more minority members in the neighborhood. In addition, a significant positive effect PminC on DisMaj emerges. This effect was smaller and only on the border of significance in Models 4 and 6. Thus, when taking into account both social contexts, opposite effects of the neighborhood and classroom contexts on majority members' tendency to socially discriminate are found. Whereas majority members discriminate *less* when living in more colored neighborhoods, they discriminate *more* when they have more ethnic minority classmates. If there is a pattern for minority members, it seems reversed. Although not significant, the effect of PminN on DisMin is positive, whereas the effect of PminC on DisMin is negative, suggesting that ethnic minorities discriminate more when living in more colored neighborhoods and less when having more ethnic minority classmates. In other words, the tendency to discriminate among classmates in favor of the own group is induced by the presence of ingroup members in the neighborhood, but reduced by the presence of ingroup members in the classroom.

Further analyses (not reported in Table 4) to investigate these opposite effects of neighborhood and classroom context were carried out for Models 5 and 7. In analogy to the distinction between 'within-group regression' and 'between-group regression' (see Snijders and Bosker, 1999, p. 28) we used as a neighborhood effect the difference between the percentage minorities in neigh-

borhood and classroom (PminN–PminC). The analyses showed that the neighborhood effects are quite stable, whereas the classroom effects were not significant but also not opposite to the neighborhood effects anymore.

Finally, to rule out several alternative explanations for our findings, two additional analyses were conducted. First, the reported models were reanalyzed incorporating the track level of the classroom. Pupils in higher track levels may be better informed and therefore less prejudiced and discriminate. This may have neutralized any effect of the ethnic composition, with which track level is correlated (Hello et al., 2002). The highest track level (VWO) showed a somewhat higher density, but the parameters for social discrimination were not affected. Therefore these models are not shown. Leaving out the schools from the first study where no individual postal area information was collected also did not alter the model results substantially.

## 4. Conclusions and discussion

Defining social discrimination as the tendency to choose intra-group over inter-group relationships in the classroom, we investigated social discrimination among ethnic majority and minority adolescents in a sample of 84 school classes in the Netherlands, with the aim to estimate the effect of ethnic composition of the classroom and the neighborhood on social discrimination. Pupils were asked to indicate five types of social relationships with other pupils in their classroom. A tie was considered present if the pupil mentioned at least one type of interaction with a classmate (where talking about taste was most common). Thus, the definition of a social relationship between pupils includes fairly superficial contact and does not necessarily imply friendship.

Majority pupils mainly named fellow majority members among their classmates, implying that they have scarce experience with inter-ethnic friendships in their classroom. In contrast, minority members reported as many relationships with majority, as with minority classmates, which makes their experiences at school are much more inter-ethnic than those of majority members. With a multilevel  $p_2$  analysis, controlling for availability, however, we found that the majority members did not socially discriminate, while the minority members did have a clear preference for own group relationships. This result is at odds with findings from studies (e.g. Verkuyten et al., 1996) showing that ethnic minority teenagers were more willing to engage in contact with majority member peers than the other way around. However, these studies measured behavioral intentions with regard to hypothetical exemplars of different groups, which may explain the difference with our data on reported ties with actual classmates.

The difference in results between absolute and relative number of ties reported is not as paradoxical as it may seem, in view of the relative scarcity of minority classmates, and is in line with Baerveldt et al. (2007) comparing ethnic preferences in classroom social networks of Dutch and Belgian high school pupils from the same age group. The multilevel  $p_2$  model takes into the account the number of available majority and minority classmates in explaining differences in density (the proportion of observed ties among all possible ties) in dyads within the same classroom and between school classes. The ethnic composition of the classrooms in this study was quite diverse, ranging from nil to 90% ethnic minority members. With the multilevel  $p_2$  model it is possible to distinguish the effect of the neighborhood composition (a pupil characteristic) from the effect of the classroom ethnic composition on social discrimination, controlling for other factors influencing the social relations between classmates, such as gender, difference in academic ability and geographic proximity. The multilevel  $p_2$  model also accounts for dependence between dyads who share pupils

as sender or receiver and allows for differential outgoingness and popularity of pupils. The  $p_2$  model does not take into account dependence beyond the dyad, such as transitivity effects, which the exponential random graph model (ERGM or  $p^*$ ) does. Since a direct comparison between results obtained with  $p_2$  and ERGM is not possible and moreover, a multilevel analysis is not readily available for ERGMs, the multilevel  $p_2$  model is the best choice for the analysis in the current study with its focus on estimating and comparing dyadic differences across classrooms. This does not rule out the possibility that triadic interdependencies may affect the degree of social discrimination observed in this study. How inter-ethnic discrimination can be best related to patterns of interdependency beyond the dyad remains a question to be addressed in a future study.

We found that the classroom composition did not have a clear effect on social discrimination by majority or by minority members. According to contact theory, a larger number of minority members in a context leads to less prejudice, and thus to less social discrimination by majority members, in particular in contexts where contacts are personal, such as classrooms. An opposite outcome, however, is predicted by competition theory, which argues that a large number of minorities is a threat to the general power position of majority members, causing both minorities and majorities to discriminate more. Neither perspective was supported. Results from a recent study using attitudinal measures by Vervoort et al. (2008), however, were consistent with competition theory. Again, general inter-ethnic attitudes may be only weak predictors of actual inter-ethnic relations, where availability and personal characteristics of members of the other group are also important.

Yet in our study, the proportion of minority members in the neighborhood was found to have a strong effect on social discrimination among classmates: majority members discriminated less and minority members discriminated more with increasing number of minority members in the neighborhood. In contrast to the expectations based on competition theory, majority members with many ethnic minorities in their neighborhoods did not discriminate more in the classroom. Instead, they discriminated less. This result is in line with other findings that show that although a rapid increase in minority members may cause inter-ethnic tension, a stable ethnic presence tends to coincide with majority members having a great deal of inter-ethnic contact and minority members having a lot of intra-ethnic contact (Gijsberts and Dagevos, 2005). We can think of two alternative, but not necessarily excluding explanations. Firstly, both phenomena may be explained by selective geographical mobility based on attitude toward ethnicity. Majority members with a more ethnocentric attitude are expected to move away from neighborhoods with a relatively large number of ethnic minority members more than cosmopolite majority members with an interest in, or tolerance for other cultures. In contrast, ethnocentric minority members may look for those same neighborhoods, more than minority members aiming for a high degree of adaptation to the majority society. Although most teenagers will not have chosen where they live, it is reasonable to assume that values and attitudes underlying their parents' choice in this respect will have at least partly been transmitted to them.

Secondly, the usually superficial interaction between neighbors may be of more value than expected. The finding that majority members discriminate less when they live in mixed neighborhoods is not in line with contact theory as originally formulated by Allport, who suggested that only personal contacts would influence prejudice. However, when we drop Allport's idea that only personal contacts matter here, his idea that contacts reduce prejudice may still hold. The main point here is that superficial contacts can have important consequences. This idea has become rather famous in the social network tradition, since Granovetter (1983) advocated the 'strength of weak ties', and is in correspondence with the views

of Blokland (2005) who uses the term 'public familiarity' to indicate that superficial encounters in the immediate surroundings can raise positive feelings of trust concerning mankind in general. With respect to inter-ethnic relations, the daily encounters in the neighborhood with members of other ethnic groups, may be particularly important in counterbalancing the often negative images of ethnic minority members broadcasted.

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